

Sugars & proteins: towards a synthetic biology

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Our work studies the interplay of biomolecules – proteins, sugars and their modifications. Synthetic Biology's development at the start of this century may be compared with Synthetic Organic Chemistry's expansion at the start of the last; after decades of isolation, identification, analysis and functional confirmation the future logical and free-ranging redesign of biomacromolecules offers tantalizing opportunities. This lecture will cover emerging areas in our group in chemical manipulation of biomolecules with an emphasis on new bond-forming and -breaking processes compatible with biology:

(i) New methods: Despite 90-years-worth of non-specific, chemical modification of proteins, precise methods in protein chemistry remain rare. The development of efficient, complete, chemo- and regio-selective methods, applied in benign aqueous systems to redesign and reprogramme the structure and function of biomolecule both *in vitro* and *in vivo* will be presented.

(ii) 'Synthetic Biologics' and their applications: biomimicry; functional recapitulation; effector [drug/agrochemical/gene/radio-dose] delivery; selective protein degradation; inhibitors of pathogen interactions; non-invasive presymptomatic disease diagnosis; probes and modulators of *in vivo* function.

